GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

Date: February 29, 1980

Project Title: Design of a Water Jet Stone Cutter

Project No: A-2579

Project Director: R. L. Tessner

Sponsor: Elberton Granite Assn; Elberton, GA

Agreement Period: From February 11, 1980 Until February 10, ~~1981~~ 1982

Type Agreement: Standard Industrial Agreement, dated 2/11/80

Amount: $6,862

Reports Required: Weekly Progress Reports

Sponsor Contact Person (s):

Technical Matters

Contractual Matters
(thru OCA)

Mr. William A. Kelly, CAE
Executive Vice President
Elberton Granite Association, Inc.
P. O. Box 640
Elberton, GA 30635
404-283-2551

Defense Priority Rating: None

Assigned to: EEL/IED (School/Laboratory)

COPIES TO:

- Project Director
- Division Chief (EES)
- School/Laboratory Director
- Dean/Director–EES
- Accounting Office
- Procurement Office
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- Project File (OCA)
- Project Code (GTRI)
- Other

28 Mar

GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION SHEET

Date 9/23/81

Project Title: Design of a Water Jet Stone Cutter

Project No: A-2579

Project Director: R. L. Tessner

Sponsor: Elberton Granite Assn.

Effective Termination Date: 6/1/81

Clearance of Accounting Charges: 6/1/81

Grant/Contract Closeout Actions Remaining:

- [x] Final Invoice ~~and Closing Documents~~
- [ ] Final Fiscal Report
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Assigned to: EDL/IED (School/Laboratory)

COPIES TO:

Administrative Coordinator	Research Security Services	EES Public Relations (2)
Research Property Management	~~Reports Coordinator (OCA)~~	Computer Input
Accounting	Legal Services (OCA)	Project File
Procurement/EES Supply Services	Library	Other _____

FORM OCA 10:781

H-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

January 9, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for December 17 and December 18.

The new rotary joint arrived from John Hilaris. I picked up some of the parts needed to install the joint and supplied them to Bo. When Bo finished I installed the new joint on the pump only to find that the motor control had shorted out because the totally enclosed fan-cooled motor had leaked water.

The motor and control were then removed from the chassis and Bo took them to be repaired.

After our Christmas shutdown I called Bo to find he had been unable to get repair parts for the motor controller. I talked to the local supplier and was told they could repair the motor controller.

The motor will have a hole drilled into the low point so that the water will drain should it get into the motor again.

Yours truly,

R. Lynnard Tessner
Industrial Extension Division

RLT:j

H-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

February 03, 1981

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for January, 1981.

On January 6 I tried to run the jet after the holiday shutdown, but the transversing motor would not run. The drive motor had water standing in it which caused the motor controller to fail.

The motor is a totally enclosed fan-cooled type which is the best type that is normally available. It should not have leaked, but for some reason it did.

The motor controller was fixed in Atlanta and taken back to the quarry where it ran for only 5 seconds before it quit again. The unit was returned to Atlanta and the main control board was replaced. The unit was returned to the quarry again on January 23.

The repaired controller worked well and was adjusted to travel 10' a minute when turned on full. The pump was run under no load condition to make sure that the seals and other parts had not failed during the long down time.

On January 26 an attempt was made to run the jet, but the nozzle drive motor would not work. Late in the day the problem was solved and the jet started. A run of almost 48 minutes was performed. It was stopped because of the lateness of the hour.

The run showed that the angle of the two jets of water was too narrow and that the down feed timers were not adjustable to a fine degree.

On January 29 a new wide nozzle was installed and the jet turned on. The main motor would not run. Bo was called to look over the main motor since it is a very expensive motor and I did not want to chance turning it up. The motor checked okay. One of the control valves was stuck. It was released very late in the day, and the jet was run.

- continued

The run was short - only 26 minutes - but it would appear that the cutting rate was 12.5+ feet^2 per hour. That rate may be high or low because one of the jets plugged and caused the nozzle to bottom.

We still need to check the 3 jet and 4 jet nozzles and then run for speed.

Yours truly,

R. Lynnard Tessner
Research [illegible]
[illegible]

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

February 20, 1980

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Elberton, Georgia

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, February 14, 1980.

At the request of Yeargin & Tate I visited the company to discuss their estimate of producing the nozzle. They have ordered some tooling and will make one nozzle out of soft steel to get the time needed to produce the nozzle.

The first design cost an estimated $7,000+ to produce, the second design cost approximately $2,000+ to produce, and the third design appears to be buildable for $500. So the use of February 7th to redesign the nozzle was fruitful.

Bill Comolli called and requested help with the design of a settling tank for his diamond saw. We worked out a design that should allow him to clean the water used to cool his diamond saw. Bill also requested help on the design of an oil circulating system for his saw. I will gather some data on equipment to form an oiling system.

Received at Granite Sales & Supply a sample of a new type of silver solder. The new material should cost much less than the present material. The old silver solder is 40% silver whereas the new material is only 5% silver. The major problem is the melting temperature which is much more than that for the old material. If the steel wire is not damaged by the high heat, we should be able to use the silver solder.

I got Bo's wire saw operator to splice a wire for me to see if the equipment could generate the high heat needed; the splice looked good.

I left a sample of the 5% silver solder with G. Tyler for use during the coming week. His saw operator is more careful when making splices than is Bo's.

Yours truly,

R. Lynnard Tessner
Research Engineer

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2) A 1590-007

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

February 29, 1980

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for February 21, 1980.

Spent the morning working on the design of the articulated arm water feed system. Because of size limitation on the arms I have had to consider adding a power steering-type device to the arms. I will gather further information during the coming week.

At the request of Frank Thomas I once again visited their quarry to check on the quarry saw. They had tried to install a drive that I told them would work; it didn't. So once again I explained in great detail how to add the needed variable speed drive. The parts numbers for the needed parts were also supplied.

Visited George Tyler's plant to see how the 5% silver solder had worked out. It had not worked well. I believe the problem is the low heat input. I requested that they try once more with a different type torch which puts out more heat. The solder may then work.

Wrote up a progress report on the water jet. Received a call from the manufacturer and they have located the needed steel. If something else does not go wrong, the pump will be here in April.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

H-2019

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

March 12, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
Elberton, Georgia

Dear Mr. Kelly:

Took a request for stone samples to Frank Thomas. A water pump company wants to test their new nozzle which they believe will cut stone at much lower pressure than the old standard nozzle. While talking to Frank, someone ran into my car and left without leaving their name; $271 later it will be fixed.

Visited Robert Veal to check on the progress of his diamond saw. His version of the Comolli saw will look much better, but it doesn't appear to be as rigid.

Checked on the progress of the diamond block saw at Coggins but they have not received the needed parts yet.

Checked on the progress of the silver solder test at Century Granite Company. By next week they will have the results.

Worked on the design of the water jet.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

A-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

March 18, 1980

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Elberton, Georgia

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, March 13, 1980.

Met with the Research Committee to describe progress made on the water jet.

Called Towler Hydraulic Company to find out just where the pump is at present.

Spent the rest of the day trying to improve the area that the machine can cover. It may be possible to go up to 16 feet without moving the machine.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

April 7, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for March 27, 1980.

Visited Atlas Granite Company at the request of Bill. He wants to change his dock location from the side to the end of his plant. He requested data on truck turn radius. I suggested that he may be able to extend his crane way and load on the outside of his building. I will supply data on steel design that will be needed to construct such an extension.

Frank Thomas requested data on radio paging system which will allow the company to page the foremen wherever they may be. He also requested that a sample of silver solder be checked for chemical analysis. The same was taken to Tech to be checked. Frank will be billed directly for this service.

Allan McGarity requested data on meter relays. A source was found on Friday and the data was supplied to Allan.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

April 8, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, April 3, 1980.

Worked with a supplier of hydraulic components to define the hydraulic component needed to power the water jet.

Supplied data to Frank Thomas on the chemical makeup of the silver solder supplied to me last week.

Worked on the problem of what size "I" beams would be needed to serve the crane extension needed at Atlas Granite Company.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

April 25, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for April 10, 1980.

At Frank Thomas' request I visited the quarry to determine what is preventing their saw from working. The company from which I had ordered the hydraulic parts sent a 4-way valve without a mounting plate. I ordered the mounting plate.

Visited Bobby Veal to see if I could be of any help with his diamond saw. Bobby is having trouble with his automatic control system for the saw. I told him I would be happy to supply him with the circuit that supplied Bill Comolli. The circuit will control the saw so that it will adjust itself to different heights of stone on each slab. In order to explain the operation of the circuit to Mr. Veal I had to go over each part. I don't know if he will use the circuit, but he seemed most interested.

Checked with Century Granite to see if the low silver content solder had been used yet. I was told that their maintenance man had been out so they had not yet run the test.

Checked with Allan to see if he needed any more help with his controls for his diamond saw.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

April 24, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for April 17, 1980.

At the request of John Brown with Coggins I visited their quarry to help John find a solution to a problem he is having with his derrick. When there is a high wind he cannot turn the derrick. I took the data needed to solve the problem and will supply the needed solution the next time I am in town. Also checked to see if the mounting plate had arrived and found that it had not been received. I checked with the supplier and learned that it had been shipped.

Checked with Century Granite Company to see if the low silver solder had worked. They reported it did work, but they would like to run more tests. I ordered 4 oz. of the material which should allow us to supply Century with a sample and also supply a number of other members a sample also.

Visited Bo at his request to answer some of his questions about face masks and how well they clean the air breathed by the user. The type mask he is considering would clean the major size dirt particles but the very fine particles would be free to pass through the mask.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

May 21, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for May 8-15, 1980.

During this period I redesigned the water jet to use the ideas suggested by Frank Coggins. The results should give much better life to the seal of the articulated joints, and may make it possible to leave off the joint. The effort has taken 5 days to design and draw with at least two more days required to finish the design.

On Thursday, May 15, I met with the Research Committee and informed them of the status of the water jet project and of all the changes that have been made.

After meeting with the Research Committee I visited the quarry to pick the site in the quarry that will be used first. The site is approximately 150 yards from the nearest power source. Since the electric cord is very expensive Iwill talk to the power company to see if they will put in a power pole closeto the site so we can use a shorter cord of 100-200-foot range.

While at Coggins I was asked to check a problem they were having with the hold-down bolts on their diamond saws. The very large bolts keep breaking. The bolts keep breaking from fatigue. I told them the standard 4 cures for the problem which hopefully will cure the problem.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISON

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

June 4, 1980

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for May 22, 1980.

Visited Yeargin & Tate's machine shop to see if progress was being made on the water jet. They had one manifold almost complete and were ordering steel for the rest of the jet assembly.

At the request of Bill Comolli I visited his plant. Bill's saw is now automatic and at night will turn itself off if anything goes wrong. But it doesn't turn itself back on and as a result Bill had lost 30 hours of production the previous week. He had called the telephone company to see if they could get his phone to call when the saw shut down but that would cost $500. He wanted to know if I could do the job for less money. I designed a device that will call either Bill's house or his brother's home and the cost should be no more than $120-140.

Visited Granite Sales and Supply at their request and showed them how to use the laser lights which they now carry in stock.

Visited Bo's plant to explain to him that there is a way to measure "polish", but it is expensive. Bo was out of town so I left the information with his foreman.

Checked with Coggins Granite to see if the electric company had visited their quarry to see if power could be located at the correct point for use with the jet. The company said it would cost $4500 to put in the needed power.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION/EEL

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

June 25, 1980

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for June 12 and 13, 1980.

At the request of Bo I visited his plant to discuss how he might improve the wear life of his cast iron grinding wheels. At present he is throwing away approximately 40% of each wheel. I told Bo that it is possible to cast small ring segments that could be mounted on a support wheel which would then allow the cast iron to be used until only 10-20% was left.

Discussed the water jet power problem with the power company to see if they would work with us to lower the price for power. Also arranged with Frank Thomas to have the water jet pump delivered to the Berkley quarry where it will be under cover until Yeargin and Tate need it. The pump occupies too much space for them to want it in their shop any longer than necessary.

Supplied George Taylor with data on cleaning the water that he wishes to recycle in his plant.

Worked with Buddy Tate to find lower cost ways of building the water jet. The plans were changed to reflect the changes needed to lower the cost.

On Friday I went to Ohio to see the pump. Again, everything went wrong. When the unit was turned on the magnetic starter burned up. The air compressor developed a short. The hydraulic valves would not shift..and on and on. By eight that evening the unit ran for a limited time. A 1000 hp unit of the same design has been built and shipped in the last six months but ours just did not want to run. However, the trip was not a waste because I have asked for some changes to be made so the pump will serve our uses more fully. I also suggested a number of spare parts that we will be needing. These parts will be shipped with the unit.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

H-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

October 24, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
Elberton, Georgia 30635

Dear Mr. Kelly:

All of our problems with the water jet can be backtracked to the lubrication used to lubricate the seals of the high pressure pump.

The first problem was the failure of the rotary joint which was caused by the water pressure not being constant. The water pressure wasn't steady because the phasing of the two high pressure cylinders was incorrect. One cylinder's air logic was going put out of phase because the lubricator air supply was being drawn from the logic air.

The seals failed because the lubricators flow divider stopped any flow of grease to the seals.

On October 17 I called the presdient of Towler Hydraulic Co. and told him of all our troubles. The company is sending their number one mechanic to correct all problems on the pump. The mechanic is due here on Monday, October 27.

The mechanic will remove the old lubricator and will install a new lubricator system. He will also double check the rest of the pump to make sure that all parts are working well.

If all parts function correctly maybe we can at last run the water jet.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

November 10, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

During the last week of October the Towler Hydraulic Company's best mechanic spent 2½ days working on the intensifier to get it to function properly. After he had the unit working I turned it on and attempted to cut granite. The rotary joint ran for only 10 minutes, and quit running.

During the following week I designed two rotary joints that we might try and also gathered data on two other designs.

My order of choice for the designs would be the rotary joint designed by John Hilaris, formelry with ITTRI; then Rodger's design and, finally, my two joint designs. John's rotary has worked for hours that I saw; Rodger's has not been up to our pressure and, of course, my own two designs have neither been built nor run as yet.

On November 6 I met with the Research Committee to discuss our choices and to receive their recommendations.

Visited Tony Adams to offer some suggestions on his microbe problem. It seems that microbes are eating Tony's cutting oil which he uses for his saw. Visited Bo to discuss his problem of profile grinding of poly-angled stones which cannot be ground on a standard profile grinder. I also checked with Yeargin & Tate to see what they would charge to build the two joints which I have designed.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

November 17, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, November 13.

During the week I was able to contact John Hilaris and discussed with his the price of his rotary joint. John wants $2,000 for the joint.

Met with you and the Research Committee to discuss which rotary joint design to use for the project.

Visited the foundry to discuss the best way to get the grinding wheel designed which Bo wants to try out in his shop. The foundryman requested a rough drawing to follow.

Got a tarpaulin to cover the water jet and went to the quarry to cover the jet.

Worked on gathering data on Tony Adams' problem of microbes. I located a source of material that can be added to the water which may cure the problem, and supplied this data to Tony.

Supplied data to Bill Comollie on the design of a small jib crane, and a bridge crane. Bill is building a shop area to service his saw plant.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

M-0217

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

December 5, 1980

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 604
Elberton, GA 30635

Dear Mr. Kelly:

Following are my activities for Thursday, December 4.

John Hilaris called on Wednesday night, December 3, to tell me that he had the swivel in hand and would ship it on December 4 via UPS.

I took a drawing of the swivel to Yeargin & Tate to discuss how the unit could be installed in our old swivel's place. Because of length difference it will be difficult to fit the new swivel into the old housing.

Went to the quarry and removed the old swivel housing from the assembly and took it back to Yeargin & Tate. Bo and I worked out the bearing size that we should need and Bo will order the needed parts.

In the afternoon, Bill Comolli called to ask if I could help him with a problem. When I reached his plant I found that his saw was down. The main way bearing had worn out and the way mount was also worn. The problem appears to have been caused by flexing of the ways under load. The only easy cure I could suggest was to cast a new support for the way and to seal the junction with silicon rubber. The long-term cure will require the construction of steel way supports.

Cleaned the old swivel and had it packaged to ship back to the Colorado School of Mines. Wrote a letter to Nick Bonge to tell him why we were returning the swivel.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

A-2017

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

February 13, 1981

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr.Kelly:

I am pleased to report the following activities for Thursday, February 5, 1981.

I visited Standard Granite Company to help George with his compressed air problems. George wants to move the air compressor and needed help with sizing his lines to avoid excessive line losses. I suggested that he keep his storage tanks in their present location and relocate the compressor and after cooler. By having the tanks at one end and his compressor at the other, the net effect would be lower line losses for any demand except for large, long duration needs.

Tried to run the jet but the ice lasted until one o'clock in the main cylinder and then a piece of ice plugged my lower pressure water regulator which resulted in a ruined gasket on the lower pressure pump. I tried to find a new gasket but couldn't find one anywhere closer than Chicago. Thus I am trying to use a sheet of acetate plastic as a gasket.

I also purchased a new gauge which was ruined by the excessive pressure ($5 worth of gauge). I also got a new pressure regulator for $6 in case the old one was also damaged.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

February 25, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, February 19th.

Rebuilt the low pressure pump with a homemade gasket as I could not find a 5/1000" gasket in Atlanta. Also installed the new pressure gauge and pressure regulator valve. After I had installed all the foregoing, I ran the jet.

The main problem I am experiencing now is the short life of my nozzle. A few have worn out on the stone and a couple have been cut up by the water jet. I have sent a letter to John Hilaris to see if the company in Chicago which made his nozzle would make us some to my design. He has not answered my letter as of this date.

I have also reached the limit of travel for the short lance that I have been using, so Bo is making me a medium length lance. The total run for Thursday was another 1¼ hours.

One problem that has come to light is that the travel rate must be reduced to approximately one-half speed about 3 inches from the end of a blind end of the cut. The speed should stay low to the end of the cut and on the return for the first three inches. The rate change is needed because the jets do not cut on the "back side" of the cut on the very end.

Yours sincerely,

R. Lynnard Tessner
Research Engineer

RLT:j

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

March 2, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

On Thursday, February 26 I took a rock sample to the quarry and and jet-cut it to a depth of approximately 3" for the museum.

Spent the day working with the jet and ran it for an hour and 20 minutes. More runs would have been made except that the jets kept plugging with metal flakes. The flakes look like stainless steel and appear to be gall flakes but could be coming from a number of sources. I will have the flakes checked for metal content to see what type alloy is involved. Maybe we can then determine the cause of the flaking.

I have contacted a supplier of high pressure filters to see what it would cost to clean the water before it gets to the jets. It appears that the price will be around $100, but I would prefer not to use a filter if possible.

My nozzle holders are all worn out and I must build new ones or have them built. I would like to find a way of not using the sapphire jewels as they are so small that handling them is very difficult. So far, however, I have not found a substitute method.

The sample run for the museum very clearly showed that it may be best to have a nozzle with 4 jets; 2 for cutting the wall away and 2 for cutting the bottom of the kerf. I believe that such a combination may yield the best cutting speedwise.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

A-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

March 9, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, GA 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, March 5, 1981

Visited Standard Granite Company at their request to assist them with the design of their diamond saw. The basic design is a copy of the Comolli saw which I designed. I believe improvements can be made which will make the saw less expensive to build, and which will also improve its cutting rate. I spent almost 3 hours with George and may have to return next week.

Visited Mac Thornton's plant to help them locate their new diamond saw. They wanted to put the saw off to the side which should result in much lower sawing output. I suggested that a location more toward the center of the plant would increase through-put to a very large extent. I also advised their wire saw operator on methods of improving his wire splicing.

Spent the afternoon designing the new nozzle for the water jet. I supplied the materials needed to build the new nozzle.

I have located a source of tungsten carbide tubes that can be used to fabricate a new nozzle. The tubes were available only on a minimum order of $50. They will have to be machined to produce the nozzles. The result should be the best possible nozzle which should increase the cutting rate. If these work as planned, the results will be well worth the cost.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

A-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

March 17, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, March 12, 1981.

A-1591-007 At the request of George Wallace I visited Standard Granite Company to continue helping George with the design of his diamond saw. I suggested a chance in the UHMW polyethelene bearings that he is going to use. Also went over the design of his way support.

Spent the rest of the day at the quarry with the water jet. Ran the jet for a total of 1 hour and 20 minutes. Because of the continuing problem of metal flakes I did not get a good run during that time. The flakes kept -2579-000 plugging the nozzles until all of the jewels that I had were plugged.

The flakes are a 300 series of stainless steel and appear to have come from the manifolds. The number of flakes should drop off with continued use.

I also ordered materials to make additional nozzles of two different designs.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

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RLT File (1)

A-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

March 25, 1981

Project A-1591-007 and
A-2579-000

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, GA 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, March 19, 1981.

Discussed with George Tyler a possible plan to gather muck, to process the material and exchange the fine silicon carbide for crude silicon carbide from Europe. The fine material is worth much more than the crude and as a result, it may be possible to sell the crude at a low enough price to keep wire saws competitive with diamond saws. George wanted help in determining what price would be required to keep wire saws competitive.

George also wants data on solar energy for heating offices and plants. I told him that a flat plate collector would work, but would cost a lot whereas a mirrored collector would be lower in cost and would provide higher temperatures. I promised him that the requested data would be supplied next week.

Wrote a listing of the main events that have taken place regarding the water jet since it was ordered. The list was presented to the Board of Directors.

Bill Comolli requested that I visit him to discuss the best way to install a small bridge crane. It was suggested that a looped cable power feed be used instead of a roller power take off.

Yours truly,

R. L. Tessner
Research Engineeer

RLT:j
Ccs: (2) Alice Eales,
Report Coordinator

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

Weekly Reporting Requirement: A-1591-007 and (Elberton Granite)
A-2579-000 (Water Jet)

March 27, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, March 26, 1981.

Took the solar energy data requested by George Tyler to his office and gave the data to Patty Tyler.

Visited Standard Granite Company to assist George Wallace with the design of his diamond saw. He has located a site and some employees to produce the saw, but still has not completed the final design. He requested assistance with the calculations for the speed of travel of his saw blade. He wants it to move very quickly up, but move down slowly.

Visited Cash & Carry Granite Company to supply data on improving a switch design that keeps leaking water.

Put together a slide show on the water jet, and wrote brief descriptions of the scene shown on each slide.

Finally, I proofread the signs in the Museum.

Yours sincerely,

R. Lynnard Tessner
Research Engineer

RLT:j

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Project Files

A 1591-007

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

A 2579-000

April 14, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Box 640
Elberton, GA 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Tuesday, April 2nd, 1981.

Visited the quarry to take pictures of the water jet for your trip.

Once again visited Standard Granite Company to help them with their diamond saw. George has started construction on the main saw head. He is going to use the old gang saw jack screws to raise and lower the saw.

Visited the Sweet City Quarry to see the building for which I drew the plans for Willie a long time ago. I also wanted to see the French polisher that is being used at the plant. Some of the Association members have expressed interest in the polisher, and have asked me what I thought of the machine.

The machine goes well with a diamond saw as it requires only limited operator attention as does the diamond saw. I believe that the machine will sell well when an American company produces it since at present the price is too high.

I called John Hilaris to see how our nozzles are doing. The company has produced 10 in an effort to get 3 good ones. They hope to ship on the fifteenth.

Attended the First U.S. Water Jet Symposium at Golden, Colorado April 5-9. I had a long talk with the vice president of Flow Research Corporation, now called "Flow". The vice president would like me to send him a sample of our own rock so he can use a "new" concept of stone removed. The plan is to drill holes closely and then to cut the web between all with water. The cost should be lower since less stone is removed. On the average water jet system produced by Flow, the maintenance costs are approximately $1.50 per hour. That cost is for units running at 40,000 psi. The company also found that for sapphire jewel nozzles the best jet of water was formed when the installation is 'backward' from the normal method of running the jewel.

- continued

A good deal of progress is being made with jets made of sand and high pressure water, and also with air bubbles in the stream. The bubbles collapse and cause damage by generating pressure that goes as high as three times to ten times system pressure. The bubbles cause local crushing and erosion of the stone. It seems that another few years will be required to develop the technique, but it does bear watching.

From the data that Flow supplied, we should be able to get an approximate value for our maintenance since many of the parts are of a similar design. The information released by one of the research teams makes me believe that a polymer may give us better cutting. I will try to have the polymer by the time the new nozzle arrives.

Yours truly,

R. Lynnard Tessner
Research Engineer
Industrial Extension Division

RLT:j
Cc: Project files
Report Coordinator (2)

A 1591-007 & M 43 77-000

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

April 20, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Box 640
Elberton, GA 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, April 17.

Visited Standard Granite Company to assist George with the design of his saw. Designed the mount system for the main rollers. Visited the construction site to see if I could offer any help.

Studied the slides of the water jet and determined those to be included in the water jet program. Wrote up the technical data on the jet and converted the data to metric dimensions.

Took the water jet cut rock sample to be cut to allow you to take a sample with you on your trip, and taped the narrative for the water jet slide presentation.

Had a late lunch and an hour for personal business.

Yours truly,

R. Lynnard Iessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j
Cc: Project Files
": Report Coordinator (2)

A 1591-007 & H 2579-000

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

April 28, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, April 23, 1981.

Visited Standard Granite Company to continue helping with the design of their diamond saw. I spent most of the moring with George designing his raise-and-lower system. The design is such that George is being forced to reconsider his approach. He wanted to feed down at a slow enough rate so that a small, inexpensive timer could be used to control the down feed. He envisioned a down feed of 3 seconds. I pointed out that a down feed of that speed would cost a great deal of saw-cutting speed. The solution would be to use an expensive timer which offers greater precision. I will have to determine the critical speed that the jack screws can turn so that the feed rate will not exceed that speed.

Reviewed with you the water jet data for the slide show. The expected delivery of the nozzle was checked. The large nozzle will be delivered next week, the small one as soon as possible.

Met with the Board of Directors to discuss the current status of the water jet. Also discussed with the board what options were available for future action on the water jet project.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

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A 2579-000

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

May 6, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for April 30, 1981.

The new water jet nozzles came in from Chicago and were installed on the machine. The results were very good. With the machine traveling as fast as it could go the channel cut was still 1/2" wider than before and the stand-off distance increased. In short, it would appear that even greater cutting speed is possible.

It was not possible to get the true cutting speed because, once again, metal flakes plugged the nozzles. The flakes were cleared, but for fear of ruining the nozzles before they can be used for our 4-jet nozzle head test, no effort was made to get the maximum speed.

After testing the 3 and 4 jet nozzle heads we can run the pump to get the maximum cutting speed. In order to protect the nozzles, a great effort was made to keep the nozzles at a large stand-off, which require very frequent checks. The net effect was that the total run time was only 45 minutes.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

A 1591-007 & A 2579-000

Georgia Institute of Technology
EES
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

May 11, 1981

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for Thursday, May 7.

Proofread the water jet report which you will deliver in Portugal. Visited Standard Granite Company to help George with his saw. He has two people working on the saw now. Went with George to see the electric control panel that is under construction for his saw. I am still trying to get George to get a precision timer for the saw since it will make money for him in the long run.

Met with the Research Committee and discussed progress on the water jet and future approaches.

Spent part of the afternoon on a personal project for which EGA will not be billed.

Yours truly,

R. Lynnard Tessner
Research Engineer

RLT:j

A 2019-000 9

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

A 157-007

May 20, 1981

Mr. William A. Kelly
Executive Vice President
Elberton Granite Association
Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

I am pleased to report the following activities for May 14, 1981

Took the new nozzles out to the quarry and ran with a two-jet nozzle. The 3-jet nozzle holder did not have weep holes and will have to be drilled before they can be used.

The two-jet nozzle using the small new jets cut slower than the two large jets, but it still cut faster than the sapphire nozzles.

Next week I will try the 4-jet nozzle and the 3-jet nozzle to see which is best. Then I will try to find out how fast the jet can cut.

I only ran the water jet for 23 minutes because one of the power cylinders is leaking around the piston rings. The leak results in oil draining out of the system. The leak rate is high, but I should be able to run it again next week.

Yours truly,

R. Lynnard Tessner
Research Engineer
INDUSTRIAL EXTENSION DIVISION

RLT:j

FINAL REPORT A-2579

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

A 2579-000
A 1591-007

May 22, 1981

Mr. William A. Kelly
Executive Vice President
ELBERTON GRANITE ASSOCIATION
P.O. Box 640
Elberton, Georgia 30635

Dear Mr. Kelly:

This weekly report, as you know, constitutes my final report under the contracts between the Association and the Georgia Institute of Technology, Project A-2579-000 and A-1591-007. My resignation from the Engineering Experiment Station is effective June 2, and I am advised by the Office of Contract Administration of their intention to effectively cancel these projects as of that date.

On Thursday, May 21, I visited Standard Granite Company to assist George with his saw design. The frame has been constructed and the fine tuning has begun. I supplied data in air bearings to be used for a sandblast booth; the conveyor keeps freezing because of sand in the rollers.

Went to the quarry and ran the water jet for a few passes over a period of 10 minutes before the jets plugged. The 3-jet nozzle cut very well until it plugged. The power piston is still leaking, so I ordered a new set of seals for the piston. Talked to Jerry to see what he will charge to replace the seals. He wants $8 and hour so I would guess that it will take from 6 to 8 hours to change the seals.

Flow Industries, Inc. is sending us filters for the water jet. Hopefully, these can be used on our jet. When the filters are installed we can run the 4-jet nozzle.

Yours truly,

R. Lynnard Tessner
Research Engineer II
Industrial Extension Division,EDL

RLT:j
Copies: Project files
Report Coordinator (2)